

New synonyms and combinations for the planthopper genus *Eusarima* (Hemiptera: Fulgoroidea: Issidae)

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Abstract. Six species originally described in the genus *Sarima* Melichar, 1903 are transferred to the genus *Eusarima* Yang, 1994 as follows: *Sarima formosana* Schumacher, 1915, *S. koshunensis* Matsumura, 1916, *S. kuyaniana* Matsumura, 1916, *S. rinkihonis* Matsumura, 1916, *S. satsumana* Matsumura, 1916, and *S. versicolor* Kato, 1933 to become *Eusarima formosana* (Schumacher, 1915) comb. nov., *E. koshunensis* (Matsumura, 1916) comb. nov., *E. kuyaniana* (Matsumura, 1916) comb. nov., *E. rinkihonis* (Matsumura, 1916) comb. nov., *E. satsumana* (Matsumura, 1916) comb. nov., and *E. versicolor* (Kato, 1933) comb. nov. The following new synonymies are proposed: *Eusarima rinkihonis* (Matsumura, 1916) = *E. delira* Yang, 1994, syn. nov. and *E. kuyaniana* (Matsumura, 1916) = *E. casca* Yang, 1994, syn. nov. A lectotype is designated for *S. formosana*. Illustrations of habitus and face are provided for *E. formosana*, *E. koshunensis*, *E. satsumana*, and *E. versicolor*, and of male genitalia for *E. formosana*.

Key words. Auchenorrhyncha, Fulgoromorpha, Issini, taxonomy, nomenclature, Taiwan, Japan, Palearctic Region, Oriental Region

Introduction

In their revision of the issid fauna of Taiwan, CHAN & YANG (1994) erected four new genera resembling externally the genus *Sarima* Melichar, 1903: *Parasarima* Yang, 1994, *Sinesarima* Yang, 1994, *Neosarima* Yang, 1994, and *Eusarima* Yang, 1994. The genus *Sarima*, erected by MELICHAR (1903) for two species from Sri Lanka (Ceylon), currently includes 29 species from the Eastern Palearctic, Oriental, and Australasian Regions (BOURGOIN 2013; HORI 1970, 1971) and is in need of revision (GNEZDILOV 2013). Six Taiwanese species, described by SCHUMACHER (1915), MATSUMURA (1916), and KATO (1933) in the genus *Sarima* were not assigned by CHAN & YANG (1994) to any newly erected genera mentioned above, because the type material was not available to the authors for study. LIANG & SUWA (1998) designated lectotypes in the Matsumura Collection, and recently I have examined a lectotype and paralectotypes of four Matsumura's species described from Taiwan and Japan, syntypes of one

Schumacher's species, and a holotype of one Kato's species, both from Taiwan, all described in the genus *Sarima*. In my opinion, these six species belong to the genus *Eusarima* Yang, 1994 (in CHAN & YANG 1994). The examination of the type material also revealed two new synonymies in the group.

Material and methods

The terminology of the head follows ANUFRIEV & EMELJANOV (1988); the terminology of the male genitalia is adopted from GNEZDILOV (2002). The photographs were taken using a Leica Z16 APOA microscope with a Leica DFC490 video camera. Images were produced using the software Leica Application Suite ver. 3.7, Auto-Montage Essentials, and Adobe Photoshop.

The material examined is deposited in the Matsumura Collection of the Hokkaido University, Sapporo, Japan (MCHU), the University Museum, University of Tokyo (UMUT), and the Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany (SDEI).

Taxonomy

Family Issidae Spinola, 1839
Subfamily Issinae Spinola, 1839
Tribe Issini Spinola, 1839

Genus *Eusarima* Yang, 1994

Eusarima Yang, 1994: 108 (in CHAN & YANG 1994). Type species: *Eusarima contorta* Yang, 1994 (in CHAN & YANG 1994), by original designation.

Nepalius Dlabola, 1997: 309. Type species: *Nepalius hellerianus* Dlabola, 1997, by original designation and monotypy. Treated as a valid subgenus of *Eusarima* by GNEZDILOV & MOZAFFARIAN (2011).

Subgenus *Eusarima* Yang, 1994

Diagnosis. Metope with distinct and complete median and sublateral carinae, joining below its upper margin. Coryphe transverse. Fore wings quite elongate, with no hypocostal plate, radius and cubitus anterior with 2 branches each, median with 2–4 branches. Hind wings well-developed, three-lobed. Hind tibia with two lateral spines. Phallobase with pair of subapical processes. Aedeagus with pair of ventral hooks arising from its apical half.

Eusarima koshunensis (Matsumura, 1916) comb. nov.

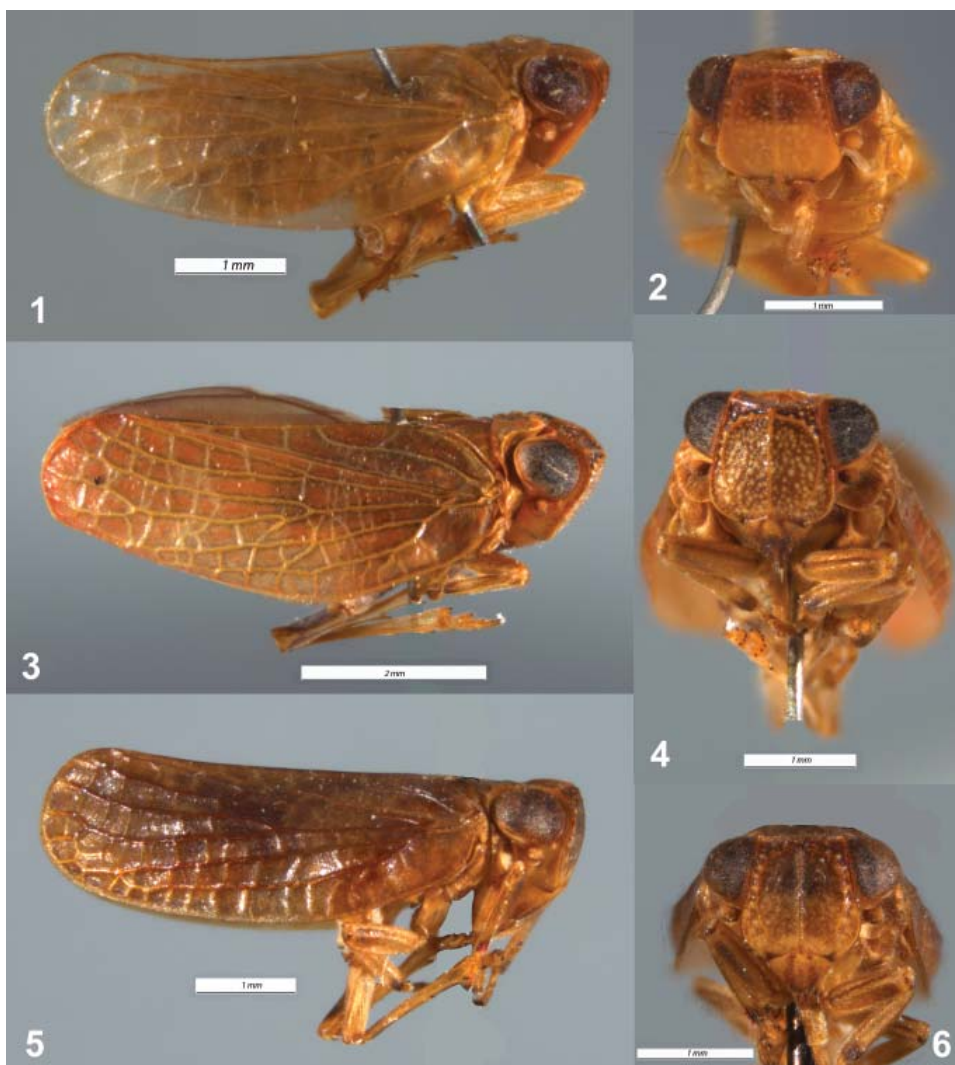
(Figs 1–2)

Sarima koshunense Matsumura, 1916: 113.

Type locality. Southern Taiwan (Koshun).

Type material examined. PARALECTOTYPE (MCHU): 1 ♀, “Formosa Matsumura (printed) / 6 VII 1906 Koshun (underside, handwritten)”, “Type Matsumura (printed) / *Koshunensis* (underside, handwritten)”, “Type Matsumura” (red, printed), “Paralectotype, *Sarima koshunensis* Mats., desig. A. P. Liang & M. Suwa 1997” (yellow, printed).

Note. In the pattern of face coloration *E. koshunensis* is very similar to *Eusarima contorta* Yang, 1994 (CHAN & YANG 1994, Fig. 45).



Figs 1–6. *Eusarima* spp.: 1, 3, 5 – habitus, lateral view; 2, 4, 6 – face. 1–2 – *E. koshunensis* (Matsumura, 1916), female paralectotype; 3–4 – *E. satsumana* (Matsumura, 1916), female lectotype; 5–6 – *E. formosana* (Schumacher, 1915), male lectotype.

***Eusarima kuyaniana* (Matsumura, 1916) comb. nov.**

Sarima kuyanianum Matsumura, 1916: 112.

Eusarima casca Yang, 1994: 113 (in CHAN & YANG 1994), **syn. nov.**

Type locality. Taiwan (Kuyania).

Type material examined. PARALECTOTYPE (MCHU): 1 ♂, “Taitung (in Chinese) 8 VI 1914 col. I. Nitobe” (handwritten), “6” (handwritten), “Type Matsumura (printed) / *Sarima n. kuyaniana* (underside, handwritten)”, “–type



Figs 7–10. *Eusarima versicolor* (Kato, 1933), holotype. 7 – dorsal view; 8 – lateral view; 9 – face; 10 – labels.

(printed), *Sarima kuyanianum* Matsumura (handwritten)” (red), “Paralectotype, *Sarima kuyanianum* Mats., desig. A. P. Liang & M. Suwa 1997” (yellow, printed).

Note. The pattern of face coloration as well as the structure of male genitalia of the dissected paralectotype of *S. kuyanianum* were compared with the drawings of the face and the male genitalia of *E. casca* in CHAN & YANG (1994, Fig. 46). Both taxa were found conspecific.

***Eusarima rinkihonis* (Matsumura, 1916) comb. nov.**

Sarima rinkihonis Matsumura, 1916: 114.

Eusarima delira Yang, 1994: 113 (in CHAN & YANG 1994), **syn. nov.**

Type locality. Taiwan (Rinkihō).

Type material examined. PARALECTOTYPE (MCHU): 1 ♂, “Formosa Matsumura (printed) / Rinkihō (underside, in Japanese), 26/IV 07 (handwritten)”, “Type Matsumura (printed) / *Sarima n. rinkihonis* (underside, handwritten)”, “–type (printed), *Sarima rinkihonis* Matsumura (handwritten)” (red), “Paralectotype, *Sarima rinkihonis* Mats., desig. A. P. Liang & M. Suwa 1997” (yellow, printed).

Note. The pattern of face coloration as well as the structure of male genitalia of the dissected paralectotype of *S. rinkihonis* were compared with the drawings of the face and the male genitalia of *E. delira* in CHAN & YANG (1994, Fig. 47). Both taxa were found conspecific.

***Eusarima satsumana* (Matsumura, 1916) comb. nov.**

(Figs 3–4)

Sarima satsumanum Matsumura, 1916: 111.

Type locality. Japan, southern Kyushu (Kiushiu).

Type material examined. LECTOTYPE (MCHU): one adult specimen with abdominal segments missing, mounted together with two nymphs on the same piece of plastic, “Kagoshima (in Japanese) 7/10” (handwritten), “Type Matsumura (printed) / *satsumae* (underside, handwritten)”, “Type Matsumura” (red, printed), “Lectotype #, *Sarima satsumana* Mats., desig. A. P. Liang & M. Suwa 1997” (red, printed).

***Eusarima formosana* (Schumacher, 1915) comb. nov.**

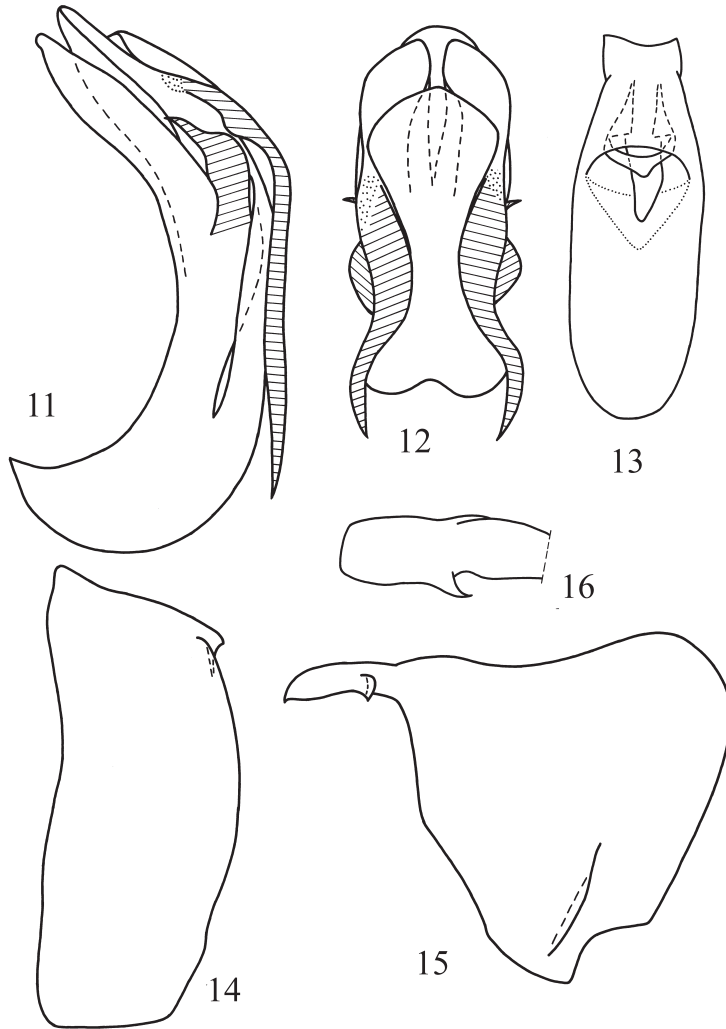
(Figs 5–6, 11–16)

Sarima formosana Schumacher, 1915: 137.

Type locality. Taiwan (Taihorin).

Type material examined. LECTOTYPE (SDEI, here designated): 1 ♂, “Taihorin, Fórmosa, H. Sauter, 1911” (printed), “7.VII.” (printed), “Syntypus” (red, printed), “*Sarima formosana* * Schum. (handwritten) F. Schumacher det. (printed)”, “Lectotype *Sarima formosana* Schumacher, 1915 Gnezdilov desig. 2013” (red, printed). PARALECTOTYPE (SDEI): 1 ♀, “Taihorin, Fórmosa, H. Sauter, 1911” (printed), “7.VII.” (printed), “Schumacher det.” (printed), “Syntypus” (red, printed).

Supplementary description. Male genitalia (Figs 11–16). Hind margin of pygofer slightly convex (Fig. 14). Anal tube long and narrow, rounded apically (Fig. 13). Anal column short, as long as one quarter of anal tube length. Phallobase slightly curved (in lateral view), with a hook-shaped process on each side below the base of ventral aedeagal hooks (Fig. 11). Ventral phallobase surface concave below ventral aedeagal hooks (from above). Ventral phallobase lobe widening apically (Fig. 12). Apical aedeagal processes wide, as long as dorsal phallobase lobe. Ventral aedeagal hooks long, arising in apical half of aedeagus, narrowing apically. Style with slightly concave hind margin (Fig. 15). Capitulum of style long, truncate apically (in



Figs 11–16. *Eusarima formosana* (Schumacher, 1915), lectotype, male genitala. 11 – penis, lateral view; 12 – penis, ventral view; 13 – anal tube, dorsal view; 14 – pygofer, lateral view; 15 – style, lateral view; 16 – capitulum of style, dorsal view.

dorsal view, Fig. 16), on short neck; apical tooth small, lateral tooth well developed. Margin of style under the capitulum convex (in lateral view).

Total length. Male – 5.5 mm.

Note. The species was described based on two specimens from Taiwan (Taihorin) (SCHUMACHER 1915). Two examined syntypes (male and female) apparently belong to different species as they are very different in the pattern of face coloration (female has a crescent light band in the middle of the metope) and the shape of fore wings (the female has shorter wings).

I designate here the male as the lectotype according to the ICZN (1999: Art. 74) to stabilize the nomenclature in the group.

Based on the structure of male genitalia *E. formosana* is closely related to (or even conspecific with) *Eusarima arva* Yang, 1994 in CHAN & YANG (1994, fig. 59). However, the lectotype of *S. formosana* differs in its face coloration – a light brown to yellowish postclypeus with two dark brown longitudinal stripes compared to an almost totally dark postclypeus, except near to metopoclypeal suture, in *E. arva*. The latter species was described based on two specimens (male and female), thus this difference in the face coloration between both species can be due to interspecific variability. Pending more material available and a further study, I prefer to treat *E. formosana* and *E. arva* as valid names.

***Eusarima versicolor* (Kato, 1933) comb. nov.**

(Figs 7–10)

Sarima versicolor Kato, 1933: 462, Pl. 14: Fig. 9.

Type locality. Taiwan (Kôshun).

Type material examined. HOLOTYPE (UMUT): ♂, “Kôshun, Formosa, (IV. 1918) (handwritten), Col. M-Kato (printed)”, “TYPE No 246, M-Kato Coll.” (red, printed with the number handwritten).

Note. The specimen was examined only based on photos (Figs 7–10).

Discussion

The type species of the genus *Sarima*, *Sarima illibata* Melichar, 1903, from Sri Lanka (MELICHAR 1903), is characterized by the unique loop of the radius vein of the fore wing which is formed by its short anterior branch (R_1), by the presence of a hypocostal plate on the fore wing, and by a characteristic carination of the metope with sublateral carinae distinct only in its upper part (MELICHAR 1906: Fig. 73; GNEZDILOV 2013). Apparently the genus *Sarima* Melichar *sensu stricto* is endemic to Sri Lanka. Six species treated in this paper have neither radial loop nor hypocostal plate on the fore wings and have complete sublateral carinae of the metope, which are the characters of the genus *Eusarima*.

Currently, *Eusarima* is the largest Oriental issid genus with 34 described species, including the new synonyms and combinations in this paper. The genus comprises two subgenera – *Eusarima* Yang, 1994 with 32 species distributed in Taiwan and (based on a new combination in this paper) also in Japan, and *Nepalius* Dlabola, 1997 with two species known from Iran and Nepal (GNEZDILOV 2009, GNEZDILOV & MOZAFFARIAN 2011).

Some other species originally described and still formally contained in the genus *Sarima*, e.g. *Sarima amagisana* Melichar, 1906 and *S. ryukyuana* Hori, 1970 known from Japan, and *S. tappana* Matsumura, 1916 from Taiwan need a further study. The published descriptions and illustrations for these species are not sufficient to decide on their correct generic placement.

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References

- ANUFRIEV G. A. & EMELJANOV A. F. 1988: Podotryad Cicadinea (Auchenorrhyncha). [Suborder Cicadinea (Auchenorrhyncha)]. Pp. 12–495. In: LER P. A. (ed.): *Opredelitel' nasekomykh Dal'nego Vostoka SSSR v shesti tomakh. Tom 2. Ravnokrylye i poluzhestkokrylye*. [Keys to the insects of the Far East of the USSR in six volumes. Volume II Homoptera and Heteroptera]. Nauka, Leningrad, 972 pp (in Russian).
- BOURGOIN T. 2012: FLOW (Fulgoromorpha Lists on The Web): a world knowledge base dedicated to Fulgoromorpha. Version 8, updated 30 June 2013. Available online at <http://flow.snv.jussieu.fr/> (last accessed on 1 July 2013).
- CHAN M. L. & YANG C. T. 1994: *Issidae of Taiwan (Homoptera: Fulgoroidea)*. Chen Chung Book, Taichung, Taiwan, 188 pp.
- GNEZDILOV V. M. 2002: New species of the genus *Tshurtshurnella* Kusnezov, 1927 (Homoptera, Cicadina, Issidae) from Turkey and Lebanon. *Russian Entomological Journal* **11**: 233–240.
- GNEZDILOV V. M. 2009: Revisionary notes on some tropical Issidae and Nogodinidae (Hemiptera: Fulgoroidea). *Acta Entomologica Musei Nationalis Pragae* **49**: 75–92.
- GNEZDILOV V. M. 2013: Notes on the genus *Sarima* Melichar (Hemiptera: Fulgoroidea: Issidae) with description of a new genus from Sri Lanka. In: KMENT P., MALENOVSKÝ I. & KOLIBÁČ J. (eds.): Studies in Hemiptera in honour of Pavel Lauterer and Jaroslav L. Stehlik. *Acta Musei Moraviae, Scientiae Biologicae* **98(2)**: in press.
- GNEZDILOV V. M. & MOZAFFARIAN F. 2011: A new species of the genus *Eusarima* Yang (Hemiptera, Fulgoroidea, Issidae) from Iran. *Acta Entomologica Musei Nationalis Pragae* **51**: 457–462.
- HORI Y. 1970: Genus *Sarima* Melichar of Japan, with the description of a new Ryukyu species (Hemiptera: Issidae). *Transactions of Shikoku Entomological Society* **10**: 79–83.
- HORI Y. 1971: Notes on some Philippine Issidae (Hemiptera). *Transactions of Shikoku Entomological Society* **11**: 60–70.
- ICZN (International Commission on Zoological Nomenclature) 1999: *International Code of Zoological Nomenclature. Fourth Edition*. The International Trust for Zoological Nomenclature c/o the Natural History Museum, London, xxix + 306 pp.
- KATO M. 1933: Notes on Japanese Homoptera, with descriptions of one new genus and some new species. *The Entomological World. Organ of the Insect Lover's Association* **1**: 452–471.
- LIANG A.-P. & SUWA M. 1998: Type specimens of Matsumura's species of Fulgoroidea (excluding Delphacidae) in the Hokkaido University Insect Collection, Japan (Hemiptera: Fulgoromorpha). *Insecta Matsumurana (N. S.)* **5(4)**: 133–166.
- MATSUMURA S. 1916: Synopsis der Issiden (Fulgoriden) Japans. *Transactions of the Sapporo Natural History Society* **6**: 85–118.
- MELICHAR L. 1903: *Homopteren-Fauna von Ceylon*. Verlag von Felix L. Dames, Berlin, 248 pp.
- MELICHAR L. 1906: Monographie der Issiden (Homoptera). *Abhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien* **3(4)**: 1–327.
- SCHUMACHER F. 1915: Homoptera. In: H. Sauter's Formosa-Ausbeute. *Supplementa Entomologica* **4**: 108–142.